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AN INSECT ENEMY OF THE PARSNIP.

BY W. H. BRITTAIN AND C. B. GOODERHAM, TRURO, N. S.

For a number of years the work of the Parsnip Webworm (*Depressaria heracliana* Dec.) has been noticed on the wild parsnip (*Heracleum lanatum* Michx) growing in the vicinity of the Agricultural College, Truro. In the summer of 1914 an attempt to grow some cultivated parsnips for seed on the College Farm was unsuccessful owing to the attacks of this insect. The shortage in the supply of vegetable seed during the past season, consequent upon conditions in Europe, has given an impetus to the local production of such seed. As a result a number of our farmers have planted small plots of parsnips for seed purposes, but with rather disappointing results, as many complaints have reached us of serious damage occasioned by this pest. It would therefore appear that a brief description of the insect, with notes on its life history and habits, would be particularly opportune at the present time.

Description:

The Egg.—Stainton* says regarding the oviposition habits of the insect: "The egg of this species is no doubt deposited in spring on the undeveloped umbels of *Heracleum spondylium* by the hibernated female." Other writers have quoted Stainton in this connection, but though a number of entomologists have informed us that they are well acquainted with the egg, we have not been able to discover any further reference or any description of this stage in the literature at our disposal.

The eggs are small, more or less rectangular in outline, with rough edges, measuring .32 - .40 mm. in length, and .17 -.19 mm. in width. They are pearly white in colour and ribbed longitudinally, as shown in fig. 1.

*Stainton, H. T., Nat. Hist. Tineina, Vol. V, Part 1, 112-113 (1861).

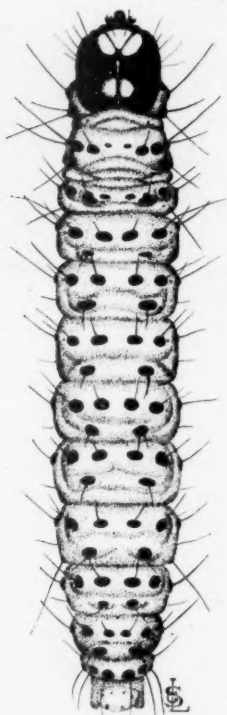


Fig. 1. Parsnip Webworm,
mature larva (X 6)

The Mature Larva.—Length 16-18 mm; diameter of second abdominal segment 3 mm.; width of head 1.75 mm. The shape is nearly cylindrical, tapering slightly towards both extremities. The general colour is greenish yellow above, light yellow on sides and beneath. The head, mouth parts, cervical shield, thoracic legs and spiracles are shiny black.

The head is notched or emarginate on its caudal border and the cervical shield is divided by a median longitudinal line. The body is beset with numerous shiny black setigerous warts or tubercles, as shown in the figure.

The Young Larva.—The larva in its first instar is 1.5-2 mm. long and differs very little from the mature larva except in size and in being a darker greenish yellow anteriorly and a lighter yellow posteriorly.

The Pupa.—The pupa measures 1 mm. long and .3 mm. wide. The thoracic segments are dark brown and the abdominal segments a lighter brown.

The Adult.—The adult is a greyish moth with a wing expanse of $2\frac{1}{2}$ mm.

The wings are of a satiny lustre and fringed with long hairs. The front wings are a dark grey with darker longitudinal streaks, the hind wings a uniform light grey. When at rest, the wings are held flat over the back, giving the insect a flattened appearance.

Life History and Habits.

The eggs were first observed this season on June 18th. They are deposited singly and in large numbers on leaves, stems, and particularly on the sheath surrounding the flower heads. The time spent in the egg stage averages about seven days, and the period of oviposition extends over a considerable period, as newly

hatched larvæ were found late in July. On hatching, the young larvæ bore through the sheath and penetrate to the young flower buds inside. Here it commences to feed and to tie the unfolding flowers together with silken threads, forming a slight silken tunnel within which it feeds. When the head at length bursts open, it may, therefore, be nothing but a mass of web with the caterpillars inside. The larva feeds thus for about four weeks upon the seeds and leaves of the plant, and then, having become nearly mature, it crawls down the stem, usually to the axil of a leaf, where it eats its way through the hollow stem and feeds for a few days until it reaches maturity. When mature, the larva builds a light cocoon of silk and excrement within which it changes to the pupal stage. The total length of the larval life averages just under five weeks, there being in all five larval instars. The pupal instar continues for three weeks, most of the adults emerging during the latter half of August, though a few belated individuals may not appear until as late as the middle of September. The adults pass the winter beneath the bark of trees, or in similar shelters. One individual was found in the late winter hidden under a rafter in a disused building on the outskirts of the College Farm.

Of the number of insects reared from the egg to the adult condition complete records were taken in the case of three individuals. This information is summarized in the following table:—

No.	Date of Hatching	Date of First Molt	Date of Second Molt	Date of Third Molt	Date of Fourth Molt	Date of Fifth Molt	Length of Larval Stage	Date of emergence of Adult	Length of Pupal Stage
1	June 25	July 2	July 7	July 12	July 17	July 29	34 days	Aug. 19	21 days
2	June 25	July 2	July 7	July 15	July 20	July 29	34 days	Aug. 19	21 days
3	June 25	July 2	July 9	July 15	July 20	July 29	34 days	Aug. 19	21 days

Geographical Distribution.

The Parsnip Webworm is an insect with a very wide distribution, having been recorded from England, Scotland, Ireland, Germany, Sweden, Finland, France and the Eastern United States and Canada. It is very common in the neighborhood of Truro, and has been sent to the Agricultural College from parts of Hants and King's Counties, as well as from New Brunswick.

Host Plants.

The plant most commonly attacked in Nova Scotia is the Cow Parsnip (*Heracleum lanatum*). The cultivated Parsnip (*Pastinaca sativa*) is usually affected whenever it is grown for seed and the Wild Carrot (*Daucus carota*) is also known to be attacked in America. Besides the foregoing, *Heracleum spondylium* and *Heracleum sibiricum* serve as food plants for the insect in Europe.

Natural Enemies.

Riley states that no parasites were bred in the United States by him, but mentions the following which have been recorded by European writers: *Cryptus flagitator* Grv.; *Pimpla heraclei* and *Hoplismenus dimidiatus*; *Cryptus profligator* Grv. and *Ophion vulnerator* Grv. Bethune was also unable to secure any parasites, but states that the Hairy Woodpecker (*Picus villosus*) destroyed many larvæ and pupæ. Harrison states that the greatest natural enemy is the earwig, which destroys the pupæ.

At Truro we have reared a number of hymenopterous parasites from this insect, but these have not yet been determined.

Remedies.

Bethune suggests dusting with hellebore for controlling the Parsnip Webworm. Riley recommends spraying with arsenate or the destruction of affected stalks. A. J. Cook says that a dilute watering mixture of an arsenate is by far the best remedy; he also recommends dusting with London Purple. Harrison believes in destroying the wild plants and handpicking the parsnip flowers.

Unfortunately we have not yet succeeded in finding any remedy that will completely control this pest, though experiments on a rather small scale were undertaken this season. The habit of the insect in tying up the seed head with silk and working inside a silken tunnel makes the work very difficult.

Spraying with lead arsenate or Paris Green just as the larvæ were hatching had little apparent effect. Dusting with Paris Green 1 part to 25 parts or with air-slaked lime gave somewhat better results, and when the umbels are open, it will prevent them from damaging any new seed. It will not, however, effect the caterpillars in the umbels which have already been tied up with silk. Cutting off and burning affected seed heads, as has been suggested, would

result in the destruction of the whole crop, in places where the infestation is as severe as in the Truro district. Furthermore, it would have little permanent effect where the pest is so numerous on neighbouring wild plants. As for destroying the wild plants that harbour the insects, these are much too numerous to commend the method to the practical farmer.

REFERENCES.

The following are the most important references to the work of this insect:—

- Bethune, C. J. S. *Depressaria Ontariella*, n. sp. (N. sp. = *heracliana* DeG.) Can. Ent., Vol. II, No. 1, Aug. 1869.
- Cook, A. J. Rep. of Zoologist, 3rd Ann. Rep. Mich. Agri. Exp. Sta. 1890; 112-115, 4 figs.
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- Riley, C. V. The Parsnip Webworm. Insect Life, Vol. I; 94-98.
- Riley, C. V. The Parsnip Webworm. Orange Judd Farmer, 17, Nov. 1888; 319.
- Southwich, E. B. The Parsnip Webworm. Insect Life, Vol. V, Aug. 1892; 106-108.
- Harrison, J. W. H. An Unusual Parsnip Pest. Entomologist, 46 (1913), No. 597; 58-59.

EXPLANATION OF PLATE II.

1. Eggs in place on sheath (insert, single egg greatly enlarged).
2. Larva, lateral aspect; stem cut longitudinally showing larva spinning cocoon.
4. Pupæ, ventral and dorsal aspect.
5. Stem cut longitudinally, showing cocoon and pupæ in situ.
6. Adult moth.
7. Flower head webbed up by larvæ.
8. Holes made by larvæ in stem of Cow Parsnip.

NEW NEARCTIC CRANE-FLIES (TIPULIDÆ, DIPTERA).*

BY CHARLES P. ALEXANDER, ITHACA, N. Y.

* The following species of crane-flies were mostly obtained from the collections of the United States National Museum and the United States Biological Survey, through the kindness of Mr. Knab and Mr. McAtee. The various species will be figured in forthcoming revisional papers now in course of completion.

Family *Tipulidæ*.Subfamily *Limnobiinæ*.Tribe *Limnobiini*.Genus *Dicranomyia* Stephens.***Dicranomyia macateei*, sp. n.**

Female—Length 4.5-4.9 mm.; wing 5-5.5 mm.

Antennæ dark brown. Head dark brownish black, the frontal region more yellowish.

Frontal scutum light yellowish brown, scutellum dull light yellow. Mesonotal præscutum shiny light brown without distinct stripes. Pleura pale yellow, more suffused with brown on the dorsal sclerites. Sternum yellow. Halteres dark brown, a little brighter at the extreme base. Legs with the coxæ bright yellow; trochanters brownish yellow; femora and tibiæ yellowish brown, tarsi pale yellowish white, the terminal segment and the claws black. Wings with a dusky tinge, the stigma distinct, large, oval, brown; the base of the sector, the cord and the outer end of cell *1st M*₂ seamed with darker brown; no pubescence on the apical cells of the wings; veins dark brown. Venation with *Sc* long, extending over half the length of the sector; *Rs* long, over twice the length of the deflection of *R*₄₊₅; basal deflection of *Cu*₁ at or slightly beyond the fork of *M*; *Cu*₂ about equal to the basal deflection of *Cu*₁.

Abdomen brown, the ovipositor and the eighth segment largely yellow.

Holotype, ♀, Plummer's Island, Maryland; May 24, 1914 (McAtee).

*Contribution from the Entomological Laboratory of Cornell University.
February, 1916

Paratypes, ♀, Virginia, near Plummer's Island; July 14, 1915 (McAtee). 2 ♀'s, Great Falls, Virginia; Aug. 11, 1915, Oct. 3, 1915 (McAtee).

The type is in the collection of the United States Biological Survey, the paratypes are in the National Museum and the collection of the author.

Tribe *Antochini*.

Genus *Teucholabis* Osten Sacken.

***Teucholabis lucida*, sp. n.**

Male—Length 3.5-4.1 mm.; wing 4.2-4.5 mm.

Rostrum and palpi black. Antennae black. Head black with a thick light gray pubescence.

Pronotal scutum dark brownish black, the caudal margin paler, brown; scutellum pale yellowish white, interrupted medially above by a brownish depression. Mesonotal praescutum shiny black, pilose medially behind, the usual pale interspaces represented only by a small reddish brown area in front, just proximad of the pseudosutural foveae, and a yellow median patch behind; scutum black shiny, with the median area in front pale yellow and with a short, pale pilosity; scutellum dull yellow, more grayish basally; postnotum black with a gray pile. Pleura light yellowish white with a broad black band extending from behind the pronotum beneath the wings to the base of the abdomen; a large rounded black spot on the sternum just before the middle coxae and a smaller patch just behind these coxae; mesosternum suffused with lemon-yellow. Halteres short, pale brown. Legs with the coxae and trochanters pale testaceous; femora light yellow, the apex broadly blackened and slightly enlarged; tibiae and tarsi dark brown, the former sometimes paler and narrowly tipped with blackish. Wings narrow, hyaline; stigmal spot brown, rounded, conspicuous.

Abdominal tergites black, the segments narrowly ringed with dull reddish yellow on the caudal margin; sternites blackish on the basal half, paler, yellowish, caudally.

Holotype, ♂, Dalecarlia Reservoir and outlet, District of Columbia; Aug 22, 1915 (McAtee).

Paratypes, 1 ♂; 1, sex uncertain, topotypic.

The type is in the collection of the United States Biological Survey, paratypes in the collection of the author.

Teucholabis carolinensis, sp. n.

Male—Length 4.2 mm.; wing 4 mm.

Rostrum and palpi black. Antennæ black. Head black with a slight grayish pubescence.

Mesonotal præscutum dark brownish black with a sparse grayish pile, the lateral margins of the segment broadly yellowish brown. Pleura dull brown with an indistinct dark brown stripe extending from the cervical sclerites caudad, becoming indistinct before the halteres; sternites brownish yellow without darker markings. Halteres short, pale, the knob brown. Legs with the coxæ and trochanters dull yellowish; femora dull brownish yellow with the apex rather narrowly blackened; tibiæ yellowish brown, the tips of the hind legs scarcely darkened, the anterior pair narrowly blackened; tarsi black. Wings narrow, nearly hyaline, the stigma quite indistinct, the veins dark brown.

Abdomen brown, the sternites somewhat paler.

Holotype, ♂, South Island, Georgetown Co., S. Carolina; Aug. 19, 1915 (Alexander).

The type is in the collection of the author.

Tribe Eriopterini.

Genus *Trimicra* Osten Sacken.

? *Trimicra empedoides*, sp. n.

Male—Length 5.5-5.8 mm.; wing 7.7-8 mm.

Female—Length 5.7 mm.; wing 6 mm.

Rostrum dull yellow, the palpi brown. Antennæ having the first segment with a gray bloom, the second segment dull yellow, flagellar segments dark brown with the base more yellowish, this bicoloured appearance becoming obliterated on the terminal segments. Head pale yellow with a light gray bloom.

Thoracic dorsum light gray, without stripes, excepting a very indistinct and narrow median vitta on the extreme anterior portion of the præscutum; beneath the gray bloom are three stripes; the lateral margins of the præscutum pale, yellowish; tuberculate pits situated far back on the sclerite, about on a level with the pseudo-sutural foveæ; the interspaces between the usual thoracic stripes with sparse coarse hairs; scutellum pale flesh colour. Pleura gray and yellow, the dorso-pleural membranes more yellowish. Halteres

rather short, light yellow. Legs with the coxæ comparatively small, pale, sparsely gray pruinose; trochanters dull yellow; femora swollen, brownish yellow, very hairy; tibiae and the first segment of the tarsus dull brownish yellow, darkened at the apex, the terminal tarsal segments dark brown. Wings grayish subhyaline, the costal region yellowish brown, the veins *C*, *Sc* and *R* yellow, the remaining veins dark brown. Venation with *Sc*₂ placed very far back from the tip of *Sc*₁, but distad of the base of the sector; cells *R*₁ very broad and almost completely filled by the very large pubescent stigma; cross-vein *r* long, oblique, inserted at or slightly beyond the fork of the sector; *R*₂₊₃ long, about subequal to *R*₂ alone; basal deflection of *Cu*₁ at the fork of *M*; cell 1st *M*₂ closed.

Abdominal tergites brownish gray, broadly margined with yellow caudally; sternites similar, the pale margins less distinct; hypopygium pale.

The female is similar to the male, but smaller, the stigma very small, and in the allotypic specimen the cell 1st *M*₂ open by the atrophy of the medial cross-vein (this latter condition undoubtedly abnormal).

Holotype, ♂, Jemez Springs, New Mexico; altitude 6,400 feet; August 8, 1916 (John Woodgate).

Allotype, ♀, Ardmore, South Dakota; August 10, 1915 (E. G. Holt).

Paratype, ♂, with the allotype; August 5, 1915.

The type and the allotype are in the collection of the author, the paratype in the collection of the United States Biological Survey.

This insect is provisionally referred to *Trimicra*, but undoubtedly represents a new genus, which will be characterized in a later paper.

Subfamily *Tipulinae*.

Tribe *Tipulini*.

Genus *Tipula* Linnaeus.

***Tipula (Cinctotipula) apache*, sp. n.**

Male—Length 12.3-13.1 mm.; wing 11.8-12.2 mm.

Female—Length about 18 mm.; wing 16 mm.

Palpi black. Frontal prolongation of the head short, brown, dusted with gray above and with a narrow, linear, median, yellow,

dorsal line; nasus very long, tipped with long golden hairs. Antennæ with the scapal segments very dark brown, the flagellum black. Front bright yellow; vertex yellow, this colour continuing as a point to the occiput; sides of the vertex and occiput dark brown.

Pronotum dark brown, the scutum with three pale yellow spots, of which one is median in position; scutellum with the lateral angles yellowish. Mesonotal præscutum dark brown with a very broad median light gray stripe, which is narrowly bisected anteriorly by a brown line, the lateral stripes very indistinct, brownish yellow; lateral margins of the præscutum pale brownish yellow; scutum with the median area shiny yellowish white, the lobes black dusted with gray and margined with black; scutellum black, the median third somewhat elevated, testaceous; postnotum dark brownish black, narrowly whitish medially in front. Pleura dark brown, dusted with gray. Halteres blackish, the base more yellowish, the apex of the knob gray. Legs with the coxæ brownish black; trochanters dark brown; femora and tibiæ dark brown narrowly blackened at the apex; tarsi dark brown. Wings infused with dusky, a dark oval stigmal blotch; a vitreous band before the cord crossing the base of the elongate cell *1st M₂* and extending into cell *M₃*; a vitreous spot beyond the stigma in cell *2nd R₁*; a number of short hairs in cell *R₃* and the tip of *M₁*.

Abdominal tergites largely brownish yellow, the caudal margin and the lateral margin except at the base brownish black; ninth tergite dark brown. Sternites similar, the extreme caudal margins of the sclerites with a fringe of pale appressed hairs.

Holotype, ♂, Jemez Springs, New Mexico; altitude 6,400 feet; July 20, 1915 (Woodgate).

Allotype, ♀, South Fork of Eagle Creek, White Mts., New Mexico; altitude about 8,000 feet; August 13 (C. H. T. Townsend); at light.

Paratypes, 2 ♂'s, topotypic; July 12, 1915 (Woodgate).

The allotype is in the collection of the United States National Museum; the type and paratypes are in the collection of the author.

***Tipula caroliniana*, sp. n.**

Male—Length 18-19 mm.; wing 19-21 mm.

Palpi dark brown. Frontal prolongation of the head rather long, light brownish gray. Antennæ with the first segment brown,

the second segment and the apex of the first bright yellow; flagellar segments with the basal enlargement very prominent, blackened, the remainder of the segments dark brown, the apical segments more uniform; antennæ elongated for this group of species. Head brownish gray, clearer and brighter toward the occiput and around the eyes; the vertex with a low tubercle bearing an impressed median line; a circular to transverse impressed mark just behind the base of the antennæ meeting on the middle line before the tubercle.

Mesonotal præscutum light gray, the stripes darker gray to brown, narrowly margined with dark brown; the median stripe is bisected by a pale line, which is likewise margined with brown; scutum brown with two light gray spots on each lobe, the largest lying caudad and proximad; scutellum and postnotum light gray, with a narrow brown median line. Pleura with the dorso-pleural membrane dull yellow, the sclerites light gray with a rounded brown spot just beneath the anterior spiracle and a smaller one on the mesopleura. Halteres light yellow, the knob brown. Legs with the coxæ dusted with light gray; trochanters brownish yellow; femora brown, the apex darker; tibiæ brown, lightest at the base; tarsi brown. Wings with a light gray tinge, the costal cell more yellowish, stigma brown; a brownish blotch at the arculus and the origin of R_s ; veins and the deflections of veins narrowly seamed with brown; hyaline spots before the cord, beyond the stigma in cell $2nd\ R_1$, base of R_2 and R_3 ; a rounded blotch in cell M at two-thirds the length of the cell; pale flecks in cell $1st\ A$.

Abdominal tergites varying from almost clear yellow throughout to a brownish yellow, the caudal margin narrowly yellowish, the lateral margins narrowly grayish; the base of the tergites with a transverse rectangular coarsely punctured area on either side of segments 3 to 5, somewhat as in *T. discolor* Loew and similar species; second sternite brownish yellow with a large rounded black spot at the base; segments two to five with punctured areas on the sides of the sclerites, on segments two, four and five transverse, on segment three oblique; apical sclerites brown, broadly yellowish on the caudal margin. Ninth tergite yellowish, the caudal margin with a small, shallow, rounded or rectangular median notch, the lateral lobes broad, obliquely truncated; dorsal surface with a

small black chitinized point on either side of the middle line connected transversely.

Holotype, ♂, North Carolina. From the collection of C. V. Riley in the United States National Museum.

Paratypes, 3 ♂'s, topotypic.

The type and a paratype are in the collection of the United States National Museum, the remaining paratypes are in the collection of the author.

This species falls in the same group with *angustipennis* Loew, *balioptera* Loew, *centralis* Loew, *serta* Loew, *septentrionalis* Loew, etc., from all of which it is easily separated by the structure of the male genitalia.

***Tipula texensis*, sp. n.**

Male—Length 11.3-12.5 mm.; wing 11.5-15 mm.

Female—Length 13.4-13.6 mm.; wing 12.5-14 mm.

Palpi dark brown. Frontal prolongation of the head dark brown, with a sparse light gray bloom. Antennæ with the first segment yellowish brown, with a sparse grayish bloom; second and third segments yellow or brownish yellow, the remaining flagellar segments yellow or dark brown basally, the terminal segments more uniformly dark brown. Head light gray, more yellowish on the occiput on either side of the median area; a delicate impressed, median, brown, dorsal line.

Mesonotal præscutum light gray with dark brown stripes, the middle stripe broadly bisected by a vitta of the ground colour, which in turn is split medially by a delicate brown line; lateral stripes almost confluent with the median stripe; scutum light gray, the lobes with an oblique brown mark; scutellum grayish testaceous, with a very delicate median brown line; postnotum light gray with or without a rather indistinct, impressed, median, brown line on the caudal fourth of the segment. Pleura light gray, indistinctly spotted with brown, the dorso-pleural membrane dull yellow. Halteres with the base bright yellow, darkening into brown on the knob. Legs yellow, with a grayish white bloom; trochanters yellow; femora dull yellow, the apex dark brown; tibiæ yellowish brown, only a little darkened at the apex; tarsi dark brown. Wings light gray, the stigma rectangular, brownish yellow; brownish blotches

at the origin of R_s , at about mid-length of cell R and in the middle of cell R_2 ; hyaline blotches in cell R between the brown spots; a hyaline band before the cord; beyond the stigma in cell $2nd\ R_1$ and in the bases of cells R_2 , R_3 and R_5 ; tip of cell R_2 hyaline; cells M_1 and $1st\ M_2$ largely hyaline.

Abdominal tergites brownish yellow, with a very indistinct, interrupted, brownish, dorsal band becoming more distinct behind; a broad sublateral dark brown band on each side, lateral margins of the sclerites broadly, the caudal margins narrowly and indistinctly, whitish; sternites dull yellowish brown, darkest on the seventh and eighth segments; in some specimens indistinctly and interruptedly trivittate.

The female is similar, with the antennal flagellum almost uniformly dark brown; the median abdominal vitta distinct.

The maximum measurements given for the male sex are those of the holotype, a large and finely coloured specimen.

Holotype, ♂, Dallas, Texas; April 7, 1906 (F. C. Pratt).

Allotype, ♀, Kerryville, Texas; March 25, 1908 (F. C. Pratt).

Paratypes, ♂, with the allotype; April 11, 1907; ♀, San Augustine, Texas; March 22, 1908 (E. S. Tucker).

The type and the paratype female are in the collection of the United States National Museum; the allotype and the paratype male in the collection of the author.

***Tipula aspidoptera*, sp. n.**

Male—Length 13.5-14.3 mm.; wing 13.6-15 mm.

Female—Length 15 mm.; wing 4.9-5 mm.

Palpi brown. Frontal prolongation of the head brownish gray, nasus short, but prominent with a few scanty hairs at the tip. Antennæ with the three basal segments light brown, the remainder of the antennæ uniform dark brown. Head light gray with a very narrow, indistinct median brown line.

Pronotal scutum light gray, the scutellum largely yellow. Mesonotal præscutum light gray, the median brown stripe very broad, a little narrowed behind, the lateral stripes rather indistinct; scutum, scutellum and postnotum light gray. Pleura with the dorso-pleural membrane yellow, the pleura clear blue-gray. Halteres long, slender, brown. Legs with the coxæ clear blue-gray; trochanters gray; femora brownish yellow, only a little darkened

at the tip; tibiae yellowish brown, a little darker at the tip; tarsi dark brown. Wings pale brownish gray, the stigma brown, the costal cell brownish yellow; wings streaked with hyaline, this colour including the basal cells and cell *R*₅ except the tip; cell *1stA* hyaline, except the broad apex.

Abdomen brownish gray, clearer gray laterally, the caudal margin narrowly brownish yellow; ninth tergite broadly tipped with bright yellowish; sternites grayish brown.

The female is similar to the male, but the antennae are shorter, the wings reduced, extending about to the end of the third abdominal segment; valves of the ovipositor rather short, the tergal valves only a little longer than the sternal pair.

Holotype, ♂, Bred from larvae taken at Alvarado, Texas (Hill); issued March 5, 1881.

Allotype, ♀, topotypic.

Paratypes, ♂, ♀'s, topotypic; ♂, Dallas, Texas; April 16, 1906 (W. D. Hunter).

The type, allotype and paratypes are in the collection of the United States National Museum, additional paratypes in the collection of the author.

This interesting species of the *tricolor* group was bred from larvae received in Washington, February 26, 1881, by Mr. Pergande from Mr. Jesse M. Hill, Alvarado, Texas. The specimens were given the lot-number 846 and the first fly issued March 5, 1881, the last on March 22, 1881 a total of some 13 males and 11 females, most of which are still in existence. This insect was determined as *T. eluta* Loew with a question by Coquillett, which, however, has a long-winged female and the antennae bicolorous. In its unicolorous antennae it likewise differs from *Tipula subeluta* Johnson, which has bicolored flagellar segments, as clearly stated in the original characterization of the species, although Dr. Dietz's key is misleading in this regard.

***Tipula comanche*, sp. n.**

Male—Length 11.2 mm.; wing 12.4 mm.

Female—Length 10.9 mm.; wing 11 mm.

Palpi brown. Frontal prolongation of the head rather long, light gray, the nasus very short. Antennae with the first segment

rather long, brownish gray, the second segment yellowish brown, the flagellum elongated, the segments dark brownish black throughout, slightly incised beneath. Head light gray with a narrow, median, brown vitta.

Mesonotal præscutum light gray with three brown stripes, of which the lateral pair are shortened; scutum with the lobes light gray, indistinctly brown in the centre; scutellum and postnotum light gray, the latter more whitish. Pleura with the dorso-pleural membrane yellowish, the sclerites clear blue-gray. Halteres elongate, light brown, the knobs darker. Legs with the coxae pale, with a sparse whitish or gray bloom; trochanters brownish yellow; femora brown, darkened on the apical half; tibiae and tarsi brown. Wings with a very pale picture, much paler than the similar *eluta* Loew and *aspidoptera* n., and in some respects suggesting *sayi* Alexander; the costal cell is yellowish; stigma rounded, yellowish brown; the membrane of the wing grayish hyaline, darkest on the apex and in the caudal cells; cell R_5 almost hyaline like the basal cells.

Abdomen brownish gray, the lateral margins of the segments broadly dull yellow, the caudal margins narrowly ringed with the same colour; hypopygium yellowish.

Holotype, ♂, Paris, Texas; April 13, 1904 (A. A. Girault).

Allotype, ♀, topotypic.

The type is in the collection of the United States National Museum, the allotype in the collection of the author.

***Tipula guasa*, sp. n.**

Male—Length 8.5-10.3 mm.; wing 8.5-10.9 mm.

Female—Length 11.2 mm.; wing 9 mm.

Palpi brown, the third segment pale at the base. Frontal prolongation of the head rather short, nasus not very prominent; the prolongation yellow, more brownish beneath, with a subimpressed brown lateral line and a sparse gray bloom on the dorsal surface. Antennae with the first segment brown, the second segment paler, the apices of the scapal segments pale; flagellum short, dark brownish black, the segments short, broad basally, narrowed toward their tips, the segments not incised. Head dark brown, paler adjoining the eyes, a little grayish on the middle line

of the occiput; in some specimens the head is gray, with only the centre of the vertex dark brown.

Pronotal scutum grayish brown; scutellum clear light yellow. Mesonotal præscutum grayish brown, the area before the pseudosutural foveæ paler, yellowish; the usual lateral stripes are indistinct, but margined narrowly with dark brown; of the middle stripe only a single narrow dark brown line persists; the thoracic stripes in some specimens are quite obliterated; extreme lateral margin of the sclerite grayish; pseudosutural foveæ very large, black; scutum grayish brown, the median area more yellowish, the lobes marked with brown; scutellum testaceous, more yellowish on the sides; postnotum lead-coloured, with a distinct median yellow vitta. Pleura yellow, with blue-gray blotches. Halteres rather short, yellowish brown, the knobs dark brown. Legs having the coxæ yellowish with a gray bloom; trochanters and femora dull yellow, the latter passing into brown on the terminal half; tibiæ dull yellowish brown, darker apically; tarsi dark brown. Wings grayish subhyaline, the costal region a little more yellowish, stigma pale brown.

Abdominal tergites dark yellow, with a very broad median brown band, the caudal margin narrowly ringed with brown; ninth tergite dark brown with the caudal half yellowish; sternites yellow, indistinctly and broadly suffused with brown.

The female has the tergal valves elongate, subacute, dark brown, the sternal valves shorter, more yellowish, acute.

The paratype males from Calvert are much larger (the largest measurements given above) but in all other respects are indistinguishable from the small specimens taken at the type-locality.

Holotype, ♂, Liberty, Texas; March 18, 1908 (E. S. Tucker).

Allotype, ♀, topotypic.

Paratypes, 4 ♂'s, topotypic; 3 ♂'s, Calvert, Texas; April 19, (W. W. Yothers).

The type, allotype and paratypes are in the collection of the United States National Museum, additional paratypes in the collection of the author.

The specific name is that of a native Indian tribe.

***Tipula arizonica*, sp. n.**

Male—Length 9.8-10 mm.; wing 11.3 mm.

Female—Length 14.5 mm.; wing 14 mm.

Palpi pale yellow with black hairs, the third segment with a sparse pale gray bloom, the terminal segment dark brown. Frontal prolongation of the head elongate, shiny yellowish, the extreme base light gray; nasus prominent. Antennae indistinctly bicolorous, the basal segments light yellow; the third segment yellow, passing into brown on the apical half; remainder of the flagellum dark brown, the basal enlargement a little more intense, the segments slightly incised. Head light gray with a subimpressed, very indistinct median brown line; a row of large hairs following the inner margin of the eye.

Thoracic dorsum opaque light yellow, without distinct stripes, although they may be faintly indicated beneath the bloom. Pleura yellow, with a sparse whitish bloom. Halteres rather short, but slender, brown, the knob a little darkened. Legs with the coxae yellow, very sparsely white pollinose; trochanters yellow; femora light yellow, soon passing into brown; tibiae brownish yellow; tarsi brown. Wings hyaline or nearly so, the costal cells yellowish, the stigma a little brownish, veins brown.

Abdominal tergites yellow, the segments three to six more brownish, the segments broadly ringed with silvery; a rounded brown spot on the sides of segment two beyond mid-length of the sclerite; rounded brown spots on the sides of segments three to five at the base; hypopygium brownish; sternites yellow, the sclerites somewhat indistinctly ringed with silvery. Ninth tergite large, the lateral angles produced slightly and bent strongly ventrad; eighth sternite very large, prominent, the apex with a dense brush of yellow hairs.

The female is like the male, but the antennae are shorter and more distinctly bicolorous; the spots on the sides of the abdomen rather distinct; tergal valves of the ovipositor very long, the tip rounded, the sternal valves very short, the apex abruptly truncated.

Holotype, ♂, Williams, Arizona; May 30 (H. S. Barber).

Allotype, ♀, topotypic; May 29.

The type is in the collection of the United States National Museum, the allotype in the collection of the author.

THE BEES OF THE CORONADO ISLANDS.

BY T. D. A. COCKERELL, BOULDER, COLORADO.

Out in the Pacific, on the edge of the continental shelf, southwest of San Diego, California, are the Coronado Islands. They consist of four rocky elevations, submerged mountain-tops apparently; the largest, South Island, about two miles long. They belong to Lower California, and hence are part of Mexico. Formerly they were difficult of access, but now a small vessel makes daily trips from San Diego, and tourists visit the islands in numbers. On August 21, 1915, my wife and I spent two hours on South Island, collecting the hitherto unrecorded insect-fauna, and especially the bees.*

Such isolated spots are extremely interesting to the evolutionist. Their fauna and flora may throw light on the rate of modification of species, or they may preserve formerly widespread, but now nearly extinct, types. The vertebrates of the Coronados have already been rather carefully studied. They possess a mouse, *Peromyscus maniculatus dubius* Allen, which occurs elsewhere only on Todos Santos Island, Lower California. It is a relatively large, dark form. The birds, 22 species, have been fully discussed in a very interesting paper by J. Grinnell and F. S. Daggett in *The Auk*, XX, 1903, pp. 27-37. One of them, *Melospiza coronatorum*, is peculiar to the islands, differing from its mainland relative by its much paler ground colour, narrower streaking and smaller bill. Another, *Carpodacus clementis*, agrees with a San Clemente I. form, and differs from that of the mainland by the bulky bill and heavy brown streaking. Thus it appears that the modification, when there is any, may be in quite opposite directions. Nine species of reptiles are recorded by Van Denburgh and Slevin, the most interesting being *Gerrhonotus scincicauda ignavus*, which belongs otherwise to the islands northward, Catalina and San Martin. The plants have been little studied, but a fine Malvaceous species,

*Dr. E. P. Van Duzee, in his account of the Hemiptera of San Diego and vicinity, appears to record species from North Island Coronado but as his preface shows, they came from the north end of Coronado Beach, San Diego, locally called North Island. There is a possible source of confusion here, to be guarded against.

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Lavatera (Saviniona) insularis Watson, is peculiar to the islands. We found that one of the commonest species on South Island was *Hazardia berberidis* Gray, described from All Saints Bay, Lower California, and not found in the United States. I am indebted to Mrs. K. Brandegee for its identification. This is not the place to discuss the flora at length, but it may be added that already introduced weeds are becoming abundant in places, more particularly the European grass *Achyrodes aureum* Linn. (det. Agnes Chase). An abundant native fern proved to be *Pellaea andromedæfolia* Kaulf (det. Maxon).

We found a single species of snail, *Micrarionta stearnsiana* Gabb, in great abundance. It is a species characteristic of Lower California, extending up the coast to the region about San Diego.

Among the insects, by far the most conspicuous species, occurring in great numbers, was a very fine *Pepsis* with red wings. I cannot, at present, separate it from the common *P. formosa* Say (*chrysothemis* R. Luc.), though it seems somewhat different from a specimen collected in New Mexico. These wasps were observed to prey on the large "tarantula" spiders, which apparently belong to *Avicularia californica* Banks, described from near San Diego. Other wasps taken were an *Odynerus* and an ordinary-looking black *Priononyx*. The common ant of South Island is *Messor andrei* Mayr. The only butterfly seen, but this abundant, was *Lycaena exilis* Boisd.; a little larger than the form of the species found in New Mexico. A specimen of *Hippodamia convergens* Guér. was collected. Various other insects, some of which look interesting, will be reported on at a later date, when they can be determined.

The bees number seven species, of which three are new, but one of them was also taken on the Californian coast. There are only two genera.

***Anthophora californica* Cresson.**

One male, at flowers of *Hazardia berberidis*. A form with hair on thorax above paler than usual. Eyes yellowish green in life.

***Anthophora urbana* Cresson.**

One male. A variety with dark tegulae.

***Halictus catalinensis* Cockerell.**

Five females. The abdominal hair-bands vary from fulvous to greyish white. The species was described from Catalina Island.

***Halictus coronadensis*, n. sp.**

Male.—Length about 6.5 mm.; slender, head and thorax dark green, abdomen very obscurely greenish, almost black; hair of head and thorax moderately abundant, erect, pure white; clypeus greatly produced, the free lateral margins not much less than half diameter of apex; malar space short; mandibles with a ferruginous subapical band; hair of face beautifully plumose, dense at sides; supraclypeal area shining yellowish green; eyes deeply emarginate; front dull; ocelli rather large; antennæ very long, flagellum light fulvous beneath; mesothorax dull, with a minutely granular appearance; scutellum shining, sparsely punctured; area of metathorax with very fine radiating striæ, and no sharp edge; posterior truncation not sharp-edged; tegulæ fulvous, dark at base; wings ample, hyaline, faintly greyish, stigma and nervures dusky brown; outer nervures not weakened; first r. n. joining second s. m. a short distance before end; third s. m. much broader above than second; legs black, the femora green behind; abdomen dull, appearing minutely granular, constricted at the ends of the first three segments, the extreme margin coppery-red; no bands, but surface of abdomen, especially at sides, with conspicuous erect hair; ventral segments not modified, except that the sixth has a delicate median raised line.

Type locality, Coronado Islands, L. Calif., Aug. 21 (*T. and W. Ckll.*). Also collected at La Jolla, California, August (*Cockerell*). When I collected these, I supposed I was getting males of *Halictus catalinensis*, of which the females occurred at the same place on the Coronado Is., but on examination it is impossible to associate the insects, which differ in many particulars, but especially in the shape of the face. The male of *H. catalinensis* is presumably more or less like that of the allied *H. provancheri*, but the new form is entirely different from *provancheri*. It appears to be a quite isolated form, standing between *Halictus* and *Augochlora*. The strongly emarginate eyes would suggest its reference to *Augochlora*, but the venation and coloration are those of *Halictus*.

***Halictus grinnelli*, n. sp.**

Female.—Length about 5.5 mm.; robust, head and thorax olive green, abdomen and legs black; pubescence white, not very

abundant; head broad; clypeus not much produced, the lower half black; supraclypeal area brassy; front and sides of face well punctured, the middle of front as closely punctured as possible, not striate; antennæ black; cheeks shining; mesothorax shining, strongly and rather closely punctured all over; scutellum closely, more finely punctured; area of metathorax strongly sculptured all over with anastomosing ridges, producing a finely reticulate effect; tegulæ rufofuscous with paler margins, impunctate; wings hyaline, not reddish; stigma and nervures reddish testaceous; hind spur with three long blunt spines, the basal one remarkably long; first abdominal segment smooth and shining, though minutely punctured; the other segments duller and more punctured, those beyond the second pruinose with pale hair.

South Island, Coronado Islands, L. Calif., Aug. 21 (*T. and W. Ckll.*). Five females, visiting *Compositæ*. One would not take this for a southern or desert species; it rather has the aspect of those of the mountains and of the north. It falls near to *H. perpunctatus* Ellis, but has the mesothorax more coarsely and less densely punctured, wings not reddish, area of metathorax shorter, etc. A related but quite distinct form, which Mrs. M. D. Ellis has named in manuscript as a subspecies of *H. perpunctatus*, occurs in Southern California. I have named this species and the next after the naturalists to whom we are indebted for an excellent account of the birds of the Coronado Islands.

***Halictus daggetti*, n. sp.**

Male—Length about 5.5 mm.; head and thorax olive green, abdomen black; pubescence white; clypeus moderately produced; face and front hairy; antennæ very long (reaching middle of metathorax), flagellum rather thick, ferruginous beneath, narrowly so on the apical part; inner orbits submarginate; mesothorax and scutellum brilliantly shining, well punctured, sparsely on disc of mesothorax; area of metathorax sculptured essentially as in *H. grinnelli*; tegulæ shining piceous; wings milky-hyaline, stigma testaceous bordered with fuscous, nervures fuscous, second s. m. narrower above; mesopleura closely punctured; legs black, with pale hair; abdomen shining, but finely and rather closely punctured, with erect pale hair, especially conspicuous at sides; the suture

between the first and second dorsal segments deeply constricted, that between the second and third moderately constricted.

South Island, Coronado Islands, Aug. 21, three males (*T. and W. Ckll.*). I at first supposed that this was the male of *H. grinnelli*, but the thorax and wings are so different that it seems necessary to regard it as a distinct species.

***Halictus nevadensis* Crawford.**

One female taken; a little larger than the mainland form, which is apparently the commonest small green *Halictus* of Southern California. I took the species at the Scripps Institute, La Jolla, and at Orange.

NOCTUID NOTES FROM WESTERN CANADA, WITH
DESCRIPTION OF TWO NEW SPECIES AND
A VARIETY.

BY F. H. WOLLEY DOD, MIDNAPORE, ALTA.

***Cucullia om'ssa*, sp. nov.**

Closely allied to *asteroides* Guen. and *postera* Guen. It principally differs from *asteroides* in being darker throughout, and having dark secondaries in both sexes. Even the darkest specimens of *asteroides* seem always to have a faint violaceous tinge to the grey of the thorax and primaries, which *om'ssa* always lacks. The discoidal spots are even less distinct than in *asteroides*. In all *asteroides* which I have examined the secondaries are clean pearly white in the basal half or two-thirds, with a very irregular and narrow dusky outer border in the male, and a broader and darker one in the female. In all my *om'ssa* the secondaries are fuscous throughout, though palest basally. As is the case in *postera*, or at least in the prairie form of that species, the secondaries are practically alike in both sexes.

In a few of the darkest specimens there is a small discal spot on the secondaries beneath. Some specimens come very near the prairie form of *postera* in colour, but the new species is less maculate and streaky than that, and the discoidal spots are much less distinct, being in fact almost obliterated by the rusty red shade overlaying the cell and areas immediately beyond it. The longitudinal streak at the anal angle, the preceding crescent and cloud,

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are exactly as in *postera* and *asteroides*. A dark brown streak bordering the full length of the inner margin exists in all *omissa* under examination, and is usually more obvious than in *asteroides*, much more so than in *postera*, from which it is often altogether absent. Size of *asteroides*.

Described from 13 ♂♂ and 8 ♀♀. Localities: 5 ♂♂, 2 ♀♀, Head of Pine Creek, near Calgary; May 18th (one), June 25th to August 13th, collected by the author; one pair, Windermere, B. C., July 12th, 1907 (the author); 1 ♀, Nelson, B. C. (H. Cane); 1 ♂, 3 ♀♀, Aweme, Man., June 6-14, 1910 (Criddle); 6 ♂♂, Cartwright, Man. (Heath collection); 1 ♀, Hymers, Ont., July 11th, 1912 (H. Dawson); and 1 ♀, Breezy Point, N.H., July 2-9, 1912 (L. W. Swett).

Types — ♂ in the author's collection, ♀ in that of Dr Wm. Barnes. Both Calgary specimens. My notes tell me that there is a specimen of this species in the British Museum from Denver, Colo., as well as typical *asteroides* from the same locality. I also have a Denver *asteroides* in my own collection.

Omissa is the No. 359 of my Alberta list, originally entered as *postera* on Smith's authority, and is the *postera* of the Kootenai and B. C. lists (Can. Ent., XXXVII, 227, June, 1905, and XLV, 94, April, 1913). The Manitoba specimens, some of which I am making co-types, are the darkest of the lot both in primaries and secondaries, and compared with Calgary, B. C., and Ontario specimens, have less of the rusty red through and beyond the cell, and contrast more strongly with *asteroides*. In fact, though I choose the actual types from Calgary, it was a study of Manitoba material which finally decided me that the form was distinct. I found a short series of both *omissa* and *asteroides* in the Heath collection, and Mr. Wallis kindly loaned them to me for study. They were all on short pins, and it is reasonable to suppose that they were collected at Cartwright, especially as both have been taken at Treesbank, about fifty miles distant.

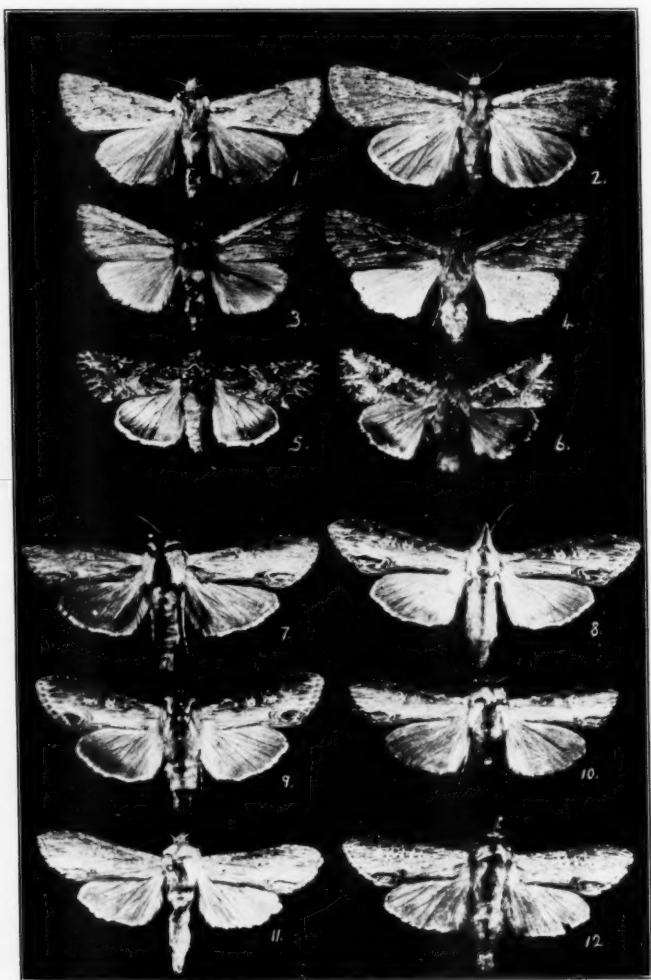
Mr. Tams has prepared two mounts of male genitalia of *omissa*, from Calgary and Aweme, and we have compared them with two of *asteroides* from Chicago and Cartwright, and one of British *asteris*, which agrees closely with Pierce's figure and description. The two *omissa* differ from the two *asteroides* in one

detail, and in that detail the deviation in the former is distinctly in the direction of *asteris*, which it resembles very closely in these organs. In *asteris*, as Mr. Pierce expresses it, "the clavus is produced to a small irregular knob, spinose." In *omissa* there is a distinct rounded spinose prominence on the clavus, though it is not similarly produced to a knob. In both my *omissa* mounts this prominence occupies the same relative position on the clavus as it does in Pierce's figure, and the clavus is much the same shape. But in my mount of *asteris* the clavus is shortened off abruptly immediately above the knob. In neither of the mounts of *asteroides* is there anything more than the faintest indication of this prominence. *Asteris* possesses two cornuti on the vesica, whereas *omissa* and *asteroides* possess only one. Superficially, also, the new species resembles *asteris* in colour and arrangement of shades more closely than does *asteroides*.

Copablepharon viridisparsa, sp. nov.

Head, thorax and primaries almost white with a very pale tinge of greenish ochreous, most pronounced in the female. The primaries have a slight irroration of grey scales, most numerous in the male, giving them a slightly sordid appearance. The male has a transverse posterior row of minute black points on the veins, very faintly indicated. Secondaries dull white in the male, with slight fuscous shadings and a fuscous central cloud; in the female a little darker and more shaded, though the central cloud is not as dark as in the male. Abdomen of the general ground colour of the secondaries in both specimens. Beneath dull white, with a dark fuscous cloud on the upper portion of the primaries from the base to the end of the cell, and extending between veins 2 and 5 nearly to the outer margin. This cloud is darkest in the male. Expanse of both specimens 45 mm.

Described from a single pair. The male from Lethbridge, Alta., July 20th, 1915, at light, by Mr. E. H. Strickland, and loaned to the author by him, and the female taken at Calgary town lights by Mr. T. N. Willing on August 7th, 1902. The ♂ type will be placed in the collection of the Dominion Entomological Department at Ottawa, and the ♀ type is in the author's collection. Both are in fine condition, though the male lacks one antenna.



NOCTUID MOTHS FROM WESTERN CANADA.

The species is the No. 385 of my Alberta List, originally recorded as *absidum*, on the authority of Dr. Fletcher. Another specimen shown me was taken at the same time and place as the female type, and is probably in the collection of the University of Saskatchewan at Humboldt, Sask. I have also seen a female specimen taken in Calgary on August 1st, 1907, by Mr. C. G. Garrett. I am under the impression that the species has been taken by Mr. Baird at High River, where *grandis* also occasionally occurs. *Grandis* has also been taken at Lethbridge.

The male antennæ are minutely serrate-fasciculate as in *grandis*. The fore tibiæ in both specimens have two claws, one on each side of the extremity, the inner one the stronger. Nearly all my *grandis* appear to have three claws, or at any rate a claw and a very strong spine on the inner side, and a weaker claw on the outer. My only specimen of *alba* unfortunately lacks fore tibiæ. Sir George Hampson does not mention any species of the genus as possessing claws, merely stating "tibiæ strongly spined." The character may perhaps be somewhat variable, and at any rate the limit between claws and strong spines is not easily defined. The new species appears to come between *grandis* and *alba*. The former is lemon yellow with pure white secondaries, the latter pure white. My notes taken on other collections indicate that neither species is always immaculate, and though the female of *viridisparsa* has stood for many years in my collection as probably new, I have thought it best to await a better knowledge of it and other species of the genus. The receipt of the fine male from Mr. Strickland decides me that it is time the form was recognized by description. Should it ultimately prove to connect with either *grandis* or *alba*, which I think improbable, the name will still hold for it as a variety.

Euxoa thanatologia Dyar. (*Porosagrotis thanatologia* Dyar, Proc. U. S. Nat. Mus., XXVII, 833, 1904). Var. *boretha* Smith, (Journ. N. Y. Ent. Soc., XVI, 86, 1908). Var. *sordida* Smith, (Id. p. 86, seq.). All three described exclusively from specimens collected at Kaslo by Mr. Cockle.

Type form *thanatologia* Dyar. Described from a single female without abdomen. Condensed, the description reads: "Head, collar and thorax uniformly dark mouse grey

Forewings light grey basally and terminally (subterminally evidently meant, W. D.), "the whole median space blackish discoloured A black basal dash Lines not strongly defined Orbicular circular, dusky filled, reniform pale and narrowly black-ringed claviform black outlined, dark filled. Subterminal line pale with black dashes preceding it, especially at interspaces 2-4 and 5-7 Terminal space blackish like the median space." I examined the type in February, 1910, and though I was unable to match it very exactly, it very strongly suggested an intermediate form between some very pale grey, and some very dark uniform brown specimens which I had taken at Calgary. Intermediate forms between these extremes have since been bred. The condition had suggested itself to me when I saw a figure of Dyar's type in the British Museum in the previous year, and seemed quite obvious when I subsequently saw a lot of material kindly loaned me by Mr. Cockle, including another figure of the type.

Var. *boretha* Smith. Described as a species (Condensed description): "Dull smoky brown. Collar inferiorly pale; . . . the pale portion limited above by a transverse black line. Costal region more or less contrastingly paler, tending to yellowish, spots discoloured, yellowish. Cell black filled A black mark below median vein in basal space. Subterminal line of the ground colour, marked by the darker colour of the terminal space preceded by a series of sagittate black marks in the interspaces. Orbicular tending to ovate, yellowish, contrasting. Reniform incompletely black margined, yellow, with smoky central line." Described from 3 ♂♂ and a ♀. Smith adds that the species appears to be allied to *terrealis*. This is explained by the fact that he had on several occasions named Calgary specimens of it "*terrealis*" for me, under which name a form of it appears in the earlier portion of my Alberta List. *Terrealis* is known to me only by the type, a ♂ from New Mexico in the Brooklyn Museum (Neumøgen collection). This has ciliate antennae, and is referable to the *Rhizagrotis* (*Rhiacia* Hbn.) section of *Euxoa*. A figure of it is pretty well reproduced by Hampson. It is probably allied to *flavicollis* Sm., and I do not associate it with the species now under discussion, nor did I recognize it in Smith's collection. He also

suggests a resemblance to *perexcellens*, though admitting a marked difference in antennæ. The association has occasionally been made by others, with certain forms of it, but seems to me rather far-fetched.

My own notes on Smith's types say that the ♂ is "almost like some *ochrogaster*," and that the ♀, which I was able to match pretty closely, is much greyer, a fact mentioned by Smith. A few weeks later I compared my same specimen with type *thanatologia*, and more than suspected their identity. This has since been confirmed by examination of additional material, including a co-type of *boretha*, in Mr. Cockle's collection.

Var. *sordida* Smith. Also described as a species, picked out of the same lot sent him by Cockle. An extract of the description is: "Dull sordid brown, more or less shaded with black and smoky. Collar concolorous, with a black median line. . . . A diffuse black streak through basal space. Cell darker or even blackish, but not solid black filled. Subterminal line marked by a slight darkening of terminal space, and by a preceding series of black interspaceal marks. Claviform narrow, pointed. Orbicular small, round or ovate, ringed with yellowish. Reniform large, edged with black; with an inner ring of yellow scales, and the centre more or less yellowish and discoloured." Described from 1 ♂ and 5 ♀♀. He adds that the maculation is like that of some of the species of the *ochrogaster* series. With this remark I entirely agree. He states further: "It differs from *boretha* in the flattened appearance, and in the concolorous orbicular, costa and collar. It varies in the amount of overlay in the median space, one example being almost purplish black." The flattened appearance is characteristic of the female, which sex predominated amongst his specimens called *sordida*. A comparison of the types with *boretha* certainly showed some contrast in the discoidal spots, but I do not think I should ever have ventured a separation upon these characters in anything allied to an *Euxoa*. My notes say of types: "The male is near some forms of *agrestis*." I matched the ♀ type pretty closely with a Calgary ♂, which up to that time I had held as a unique, though since then I have been able to find links connecting it with the rest of my material. Mr. Cockle has

helped me liberally in this, and lent me, along with other specimens, his *sordida* ♀ co-type.

There remains yet another well-marked form of *thanatologia*, not included in any of the above descriptions, which I now describe as follows:

Var perfida, var. nov. Head, collar, thorax and primaries even dull mahogany brown. A paler shade appears at the base below the median vein, sometimes pale sienna brown, sometimes greyish ochreous. This is usually very faint, diffuse, sometimes extending to the inner margin and sometimes taking the form of an ill-defined basal streak, extending to the outer extremity of the claviform. In some specimens the cross lines are barely indicated, and are rarely very distinct. The defining geminate portions may be just perceptibly darker than the ground, but they may be traceable only by the slightly paler filling of ochreous or sienna brown. Basal half line outwardly crenate in the interspaces. T. a. line almost upright, outwardly crenate in the interspaces. T. p. line with the outer portion obsolete, inwardly crenate in the interspaces, evenly outcurved over the cell, direct from veins 3 or 2 to inner margin. S. t. line indicated by a slightly paler shade, of the same colour as the filling of the other lines and the basal shading. The veins are sometimes just perceptibly darker, and there are sometimes faintly pale intervenular streaks preceding and of the same shade as the subterminal line. Claviform faintly indicated by ochreous scales. Orbicular absolutely concolorous, round or oblique, very narrowly ringed with pale ochreous grey, incomplete superiorly. Reniform moderate, pale ochreous, incompletely paler ringed, with an irregular filling of the ground colour, which is very slightly darker inferiorly. A very fine terminal darker line occasionally present, as is also a slightly paler line at the base of the fringes, which are the least shade paler than the ground colour. Secondaries not differing at all from other named forms of the species, dull fuscous, or faintly ochreous, white, dark fuscous outwardly, fringes whitish.

The number of specimens now before me to which this description applies is ten, all females, and I have never yet seen a male approaching this form. Localities: —Alberta: Calgary (6, 1 bred);

Red Deer River, (1); High River Baird, (1). Manitoba: Miniota, Dennis, (1). B. C.: Kaslo, Cockle, (1).

Type—♀, High River, Alta., Mr. Thomas Baird. This is the darkest and most even of all the specimens, and very closely resembles Holland's plate XXIII, fig. 6, which is unquestionably this form, is probably a ♀, and may be of a Calgary specimen. I consider this the more probable, as I sent Dr. Holland a number of Calgary specimens for figuring in that work, including the present form under the name "*titubatis*" on the authority of Smith. It is the No. 224 of my Alberta List, under the name "*punctigera*," on Smith's later authority (Can. Ent., XXXVII, 54, Feb., 1905). The form has no dead black markings whatsoever, and the general colour is very even. There is no darker basal streak, no indication of darker filling either in the discoidal spots or cell, except occasionally the slight inferior darkening of the reniform, no black dashes preceding the subterminal line, and the terminal space is usually of exactly the same colour as the rest of the ground, or barely perceptibly darker. As a rule, the only real contrast is the reniform. The form is the one predominating at Calgary, very few years having passed when I have not taken at light or treacle at least a few specimens, and always females. Moreover, I have very rarely taken any other forms here, and great was my surprise when I finally traced their connection with some other forms by means of comparison of types, and breeding, and a study of Kaslo material. I have not infrequently received the form from Manitoba and Saskatchewan. It occurs also at Banff, and I am under the impression that I have seen it from Vancouver Island. A few specimens were included in the material referred to as "*punctigera*" in the Kootenai List, though the bulk of the specimens were *perfusca* Grt. (*cocklei* Sm.),* occasional forms of which are certainly not unlike it. One of my Calgary females of *perfida* was taken by me in 1894 in cop. with a small dark red male, unfortunately rather worn, but practically indistinguishable from a small even red *ochrogaster*. For the next twenty years I never took a male at all like it which I did not feel tolerably safe in associating with *ochrogaster*, though I saw a few similar males from Saskatchewan and

*Can. Ent., XLIII, 339, Oct. 1911.

Manitoba, and have some from there now in my collection. The possibility of a mismatch by the 1894 male still rendered the association doubtful, until Mr. Tams bred similar specimens from a dark female *sordida*, some of the results of which breeding are referred to in the explanation to Plate II, given below. Its likeness to a red *ochrogaster* is so exact, that, though it well deserves a varietal name, I dare not risk description except from specimens bred from a known parent, and I have not enough of such for distribution at present.

I may summarize by briefly designating the named variations of this species as follows:

E. thanatologia Dyar. Light grey, median and terminal space dark mahogany brown, contrasting. Black sagittate dashes preceding the subterminal line. Known in female sex only.

var. *boretha* Smith. Dull sienna brown, with pale collar and costa. Cell black filled, spots contrastingly pale. Sagittate s. t. dashes. As a very grey female was included under this description, the name should be considered as applying to the red-brown form only. Females of this form appear to be very rare.

var. *sordida* Smith. Uniform dull red-brown or blackish-brown, more or less shaded with black or smoky. Cell darker or blackish. Sagittate s. t. dashes. This is a considerably darker form than *boretha*, and lacks the pale collar and costa. The great majority seen of this form have been females.

var. *perfidia* Dod. Even dark mahogany brown with a very few pale ochreous or sienna brown lines and shadings. No black markings. Orbicular and reniform pale ringed, concolorous centrally, the reniform contrasting somewhat. Known to me in the female sex only.

As each of Smith's descriptions was drawn from a series of specimens, no two of which were alike, it seems best to fix the varietal names as nearly as possible fitting the actual types.

The expanse of the species varies from 34 mm. (a captured ♂) to 43 mm., the males as a rule being the smallest. I think this is the most variable *Euxoa* known to me on this continent, with the

doubtful exceptions of *auxiliars* and *tessellata*. Mr. Cockle has shown me a specimen rather strongly divergent from any I had previously seen, though in conjunction with the rest there are indications that it probably belongs here. It is the specimen referred to as *gagates* Grt. in the Kootenai List, and bore a label on Smith's authority "*balintis*." Though it certainly suggests a dull form of the latter, I think *thanatologia* the more probable. Though I have mentioned that certain variations bear more or less resemblance to several other species, and may possibly be confused with them, the general relationship is perhaps really closer to *ochrogaster* than to any other. The wing form is very similar. In fact, as already stated, I believe males are frequently inseparable superficially, though the larvæ are very different. The male antennæ in *ochrogaster* are usually a little more strongly serrate, but this difference is not reliable. The female abdomen of *thanatologia* is, however, more depressed and laterally cylindrical. *Punctigera* has several nearer allies, though so far as it is yet known, it is a dark brown little-marked form much after the manner of *perfida*, but is a broader winged species, has rougher scaling, and lacks the depressed abdomen in the female. It should be remarked, however, that this latter character varies somewhat in any species, according to the age at death, feeding, and degree of egg development in the individual. *Titubatis* Sm. (= *intrita* Morr.) is another species having a dull mahogany, poorly-marked form, extremely like *perfida* in colour, but it has shorter and more trigonate wings, differs in details of maculation, has more quadrate thorax with heavier vestiture, and very distinctly longer serrations to male antennæ. The confusion of occasional females is quite excusable.

Dr. Dyar referred his species to *Porosagrotis* on the strength of its possessing stout tibial claws. The character is a variable one throughout *Euxoa*, and is not a reliable guide. Smith stated that the form of the male genitalia was the only character which distinguished the genus. I admit not having so far examined them, but surely a genus based on genital structure is scarcely valid. The reference to *Chorizagrotis* was based on the flattened form of the abdomen, particularly in the female, and the narrow, elongate primaries. Sir George Hampson treats the genus as a section of

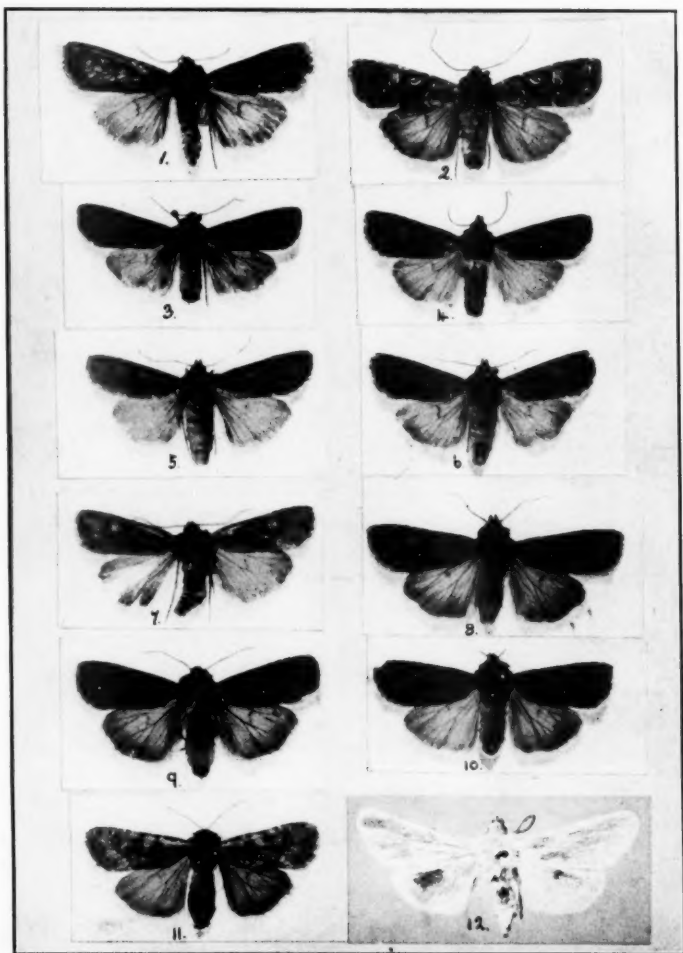
Euxoa, having male antennæ minutely serrate-fasciculate. In the present species they vary from almost simple fasciculate, to what he would call "moderately" serrate-fasciculate, variation being noticeable in specimens bred from the same female. The general rule for the ♂♂ is, however, minutely serrate-fasciculate as in *auxiliaris*.

Thanatologia flies from the latter end of June till about the middle of September. My earliest record is June 30th.

EXPLANATION OF PLATES III AND IV.

PLATE III.

- 1—*Euxoa querula* Dod, ♂ co-type. Red River, near Gleichen.
- 2— " *querula*, ♀ type. Red Deer River, near Gleichen. (Can. Ent., XLVII, 36, No. 625, Feb., 1915.) Described under *Rhizagrotis*, which is treated by Hampson as a section of *Euxoa* with ciliate male antennæ.
- 3— " *lagna* Grt., ♂. Stockton, Utah.
- 4— " *lagna* Grt., ♀. Eureka, Utah.
- 5—*Cardepi mutata* Dod, ♂ type. Calgary. (Can. Ent., XLV, 29, No. 299, Feb. 1913.) Described under *Mamestra*, but referred by Hampson (in litt.) as a *Cardepi*, very near *nova* Smith. By structural characters this reference seems correct.
- 6—*Scotogramma trifolii* Rott., var. *albifusa* Walk. ♂, Montreal (Winn.) *Trifolii* is referred to *Scotogramma* by Hampson.
- 7—*Cucullia, omissa* Dod, ♂ type. Calgary.
- 8— " *asteroides* Gn., ♀. Aweme, Man. In collection of N. Criddle.
- 9— " *postera* Gn., ♀. Calgary.
- 10— " *montanae* Grt., ♂. Calgary.
- 11— " *indicata* Sm., ♂ type. Sheep Creek, near Calgary. I have referred this name to *obscurior* Smith, and both to *floreana* Gn. The colour is blue grey, very near that of *intermedia*.
- 12— " *similaris* Grt., ♂. Didsbury, Alta.



NOCTUID MOTHS FROM WESTERN CANADA.

PLATE IV.

- 1—*Euxoa thanatologia* Dyar, var. *sordida* Smith., ♀. Calgary.
The figure is a trifle too dark. The only male I have seen as dark as this specimen was taken last summer at Lethbridge, by Mr. Strickland.
- 2— “ *thanatologia*, var. ♀. The type *thanatologia* is something between this and fig. 11. It has the basal and subterminal areas pale grey, as in 11; the median about as dark as the terminal in 2, with more and longer ante-subterminal black dashes.
- 3— “ *thanatologia*, var. ♀. Paler than No. 2 basally and subterminally, with darker median area, and median shade line.
- 4— “ *thanatologia*, var. *perfidia* Dod, ♀. The palest I have of this variety.
- 5— “ *thanatologia*, var. ♂. This is very near var. *boretha*, but lacks the pale collar and costa. The ground colour is brownish red, closely approaching the *ochrogaster*-like forms.
- 6— “ *thanatologia* var. ♂. This is a deep red form with ochreous grey ringed spots and shadings, which could very doubtfully have been distinguished from a common form of *ochrogaster* if it had not been bred with Nos. 2, 3, 4, 5 and several others, from eggs laid by No. 1. The introduction into the brood, unobserved, of the very dissimilar larva of *ochrogaster* is not in the least likely. The contrast in colour between the red of 5 and 6, and the brown of 3 and 4, is almost entirely lost in the photograph. The average size of the bred (forced) specimens is a little smaller than usual, though one characteristic of the species is its size variation.
- 7— “ *thanatologia*, var. *boretha* Smith, ♂. Kaslo (Cockle). Pale, very slightly reddish brown. A little darker and better marked only than a ♂ co-type in colln. Cockle. One of the males bred from No. 1 was almost exactly like this, but badly crippled on one side.

- 8— “ *thanatologia*, var. *sordida*, ♂. Calgary. The colour is dark red brown, and the specimen has been compared with the ♀ type, and is very like it, but the type is more ochreous, and has sharply defined s. t. dashes. It is the largest ♂ I have taken.
- 9— “ *thanatologia*, var. *perfida* ♀ type High River, Alta. (Baird.) The specimen is characterized by lack of any contrasts.
- 10— “ *thanatologia* Dyar, var. *sordida*, ♀. Calgary. Like some *perfida* in colour with the addition of numerous fine black markings. This is one of the actual specimens named “*terrealis*” for me by Smith, and referred to in my Alberta List under that name. (Can. Ent., XXXVII, 51, No. 225, Feb. 1905.)
- 11— “ *thanatologia*, var. ♀. Calgary. Rather pale grey, with black and sienna brown lines and shadings. This has been compared with the ♀ type of *boretha*, and is not unlike it, but greyer. It was also compared with type *thanatologia*. See remarks under fig. 2. The actual resemblance of No. 11 is to some forms of *auxiliaris*. I have another Calgary specimen almost exactly like it, but with longer subterminal black dashes. Mr. Cockle has specimens very like this.
- It is strange that out of nine imagines bred from No. 1 four of them were rather sharply distinct in appearance from any previously taken at Calgary, viz., Nos. 2, 3, 5, and one like 7.
- 12— *Copablepharon viridisparsa* Dod. ♂ type.

Photographs by W. H. T. Tams, by whom the bred specimens were reared.

A NEW SPECIES OF *BARYODMA*

BY THOS. L. CASEY, WASHINGTON, D. C.

Because of its apparent economic importance, I have been requested by Mr. Arthur Gibson, Chief Assistant Entomologist of the Department of Agriculture, Ottawa, Canada, to draw up a description of the following species for early publication, in order

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that it may be referred to definitely by name in official reports. The species belongs to the *verna* group of *Baryodma*, having the mesosternal process narrow and with fine strong medial carina, and it should follow the Colorado species described by me some years ago under the name *suffusa* (Tr. Acad. Sc. St. Louis, 1906, p. 162).

***Baryodma ontarionis*, n. sp.**

Shining black throughout, the legs barely at all paler, the elytra sometimes, but not always, finely, suffusedly reddish at the apical margin internally; pubescence rather short and coarse, not at all close; head orbicular, with evident but sparse punctures, the eyes very moderate in size and not prominent; antennæ attaining the base of the prothorax, black, moderately incrassate, the outer joints transverse, the last slightly longer than the two preceding combined, the second and third rather long and subequal; prothorax nearly one-half wider than long, widest near the base, which is evenly arcuate, the sides thence feebly converging and moderately arcuate to the apex, the basal angles rounded; surface evenly and moderately convex, with small, remote and irregularly distributed punctures, more closely aggregated in two widely separated and scarcely at all impressed longitudinal lines along the middle; elytra transverse, barely wider, the suture somewhat shorter, than the prothorax, the punctures rather strong and deep, evenly and not very closely spaced; abdomen parallel, punctured nearly like the elytra, the first two tergites broadly and rather deeply impressed, the third very obsoletely, the impressions not differently sculptured; tarsi rather short, slender, piceo-rufescent. Length 2.6-4.0 mm; width 0.78-1.2 mm. Ontario (Ottawa) and Quebec (Coaticook).

This species seems to be rather common, and I have received numerous examples from Mr. Beaulne, besides the series recently sent by Mr. Gibson. It differs from *verna* and allied species in not having a well defined pale spot near the inner apical angles of the elytra, and from *suffusa*, in its black elytra, less anteriorly narrowed prothorax and more distinct elytral punctures, besides the less apically incrassate antennæ. It does not seem to resemble closely any European species known to me.

A NEW SPECIES OF CATOCALA.

BY G. H. FRENCH, CARBONDALE, ILL.

Catocala julietta, n. sp.

Expanse of wings three inches. Fore wings gray, a slight yellowish tinge, moderately sprinkled with brown and black scales; a heavy shade below submedian vein, continued outside the reniform to subcostal vein, reminding one of the markings of *C. pura*. Basal dash, a narrow black line reaching to the basal line; basal line heavy to subcostal vein, below this indistinct; t. a. line prominent, the lower part lost in the shade below submedian vein; median shade distinct to the upper end of reniform, from this point indistinct; reniform a pale oval with a central shade line; subreniform nearly white, slightly sordid, closed; orbicular obsolete; t. p. line single, heavy, obsolete or nearly so on costa, teeth opposite cell short as in *C. stretchii*, a pale space inside the t. p. line opposite the reniform; subterminal shade often prominent in *Catocalæ* rather indistinct here, brownish; a double subterminal line, the inner part less prominent than the outer, the enclosed space pale; a terminal row of intervenular lunules; fringe gray with a basal black line.

Hind wings red, of the shade found on *C. walshii* and *C. stretchii*; outer black band wide, about as in *C. walshii*, the two inner dentations near anal angle sharper than in *C. walshii*, band reaching anal angle in a line; median band a little narrower than in *C. walshii*, about as in *C. stretchii*, reaching only to submedian vein.. constricted in its middle and at bend in lower end, band not ending in a sharp point; hairs along inner margin pale smoky; apical spot very pale pink, intervenular points next to the fringe the same, shade, small; fringe white.

The under side similar to its allies, a little more gray on apex of fore wings.

One male, captured in woods near Carbondale, August 23, 1915, by Miss Juliette Hanford, to whom I have dedicated the species. The specimen is in the cabinet of the writer.

While differing in the markings of the fore wings, yet the size, tint of gray and colour and markings of hind wings, would place this species near *C. walshii* in our lists.

Mailed February 11, 1916

